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"ICT Based Education: A Paradigm shift in India"

Nishant Gunjan

Department of Education(B.Ed), M.L.T. College, Saharsa (Bihar)- 852201, India.

E-mail: nishantgunjan@ymail.com

Abstract

Information and Communication Technologies are today playing a very important role in transforming the mode of imparting education. Education at all levels has been significantly impacted by the tremendous innovations in ICT especially in the field of telecommunications and multimedia applications. A few decades ago, technological devices like radio, television, film strips, OHP, audio and video cassettes were used to make teaching effective and enhance learning. But now a days, teaching and learning has been enhanced by a vast array of ICT based technologies in the form of interactive radio, teleconferencing, web based and satellite based services. ICT provides opportunities to access an abundance of information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments. The world in which we live is changing rapidly and the field of education is experiencing these changes in particular as it applies to media services. The old days of an educational institution having an isolated audio-visual department are long gone! The growth in use of multimedia within the education sector has accelerated in recent years and looks set for continued expression in the future. The present paper focuses on integration of ICTs in educational system in India and highlights on present educational scenario. This paper is an attempt to draw attention on policies implementation regarding ICT integration and effectiveness of teaching-learning environment.

Keywords: ICT in education, Educational Technology, Web Based Classroom, E-learning, Distance Education

Introduction

Information Technology (IT) is revolutionizing and changing almost all aspects of our daily life. Lot of computation and communication is happening around us through IT. The influences of IT revolution are also felt in our education system and since a decade, efforts are being made by the Indian Government for promotion of Information and Communication Technologies (ICTs) in education. Slowly in our education system the dependence on ICT

is increasing. Educational Technology standards are the roadmap to teaching-learning effectively and growing professionally in an increasingly digital world. During this digital age, we need to have rethinking on our instruction, training and curricula. Old educational models will simply not do any good to anyone. The new and newer technologies have put on pressure to educational practices as well. There is a timely need for new student support mechanisms, teacher-student interactions, assignments handling, assessment and evaluation and providing feedback .there is no denying the fact that technology has changed the way we teach, learn, and think. Movements have been observed from curriculum-oriented to learner oriented methodologies, from individual-oriented to collaborative-oriented tasks and from passive-learning to active learning.

ICT Based Education

Information and Communication Technology (ICT) has revolutionized the society in general and education in particular. ICT is a powerful tool for extending educational opportunities both formal and non-formal to all sections of the society particularly to the unserved sections of population. The International Institute for Communication and Development (IICD) has emphasized that ICT can be used to improve the quality of education by enhancing educational content development, supporting administrative processes in schools and other educational establishment and increasing access to education for both teachers and pupils via distance learning. As far as use of ICT in education is concerned, two concepts such as e-learning and blended learning are recently used to fortify the role of ICT in education. According to Tinio "e-learning encompasses learning at all levels, both formal and non-formal that uses an information network –the internet; an intranet(LAN) or extranet (WAN)-whether wholly or in part, of course delivery, interaction and or facilitation". Others prefer the term on-line learning, web-based learning in a subset of e-learning and refer to learning by using an internet browser. The other term used in educational technology is blended learning. It refers to learning models that combine traditional classroom practice with e-learning solutions. For example, students in a traditional class can be assigned both print based and online materials; have online mentoring sessions with their teachers through chats and subscribed to a class e-mail list. UNESCO recognizes that "These technologies have great potential for knowledge dissemination, effective learning, and the development of more efficient education services".

In India satellite based teleconferencing (one-way video and two way audio) non-formal education has been operational since 1992 at national and regional levels. The ICT mission for school education in India aims to devise, catalyse, support and sustain ICT and ICT enabled activities and processes in order to improve access quality and efficiency in the school system.

According to UNESCO, ICTs can be used in education to:

- ❒ Improve administrative efficiency
- ❒ Disseminate teaching learning materials to teachers and students

- Improve the ICT skills of teachers and students
- Allow teachers and students access to sources of information from around the world
- Share ideas on education and learning
- Collaborate on joint prospects
- Conduct lessons from a remote location

The six focus areas of ICT in education programme as emphasized by the UNESCO policy are-teacher training, teaching and learning, non-formal education, monitoring and measuring, research and knowledge sharing. The international institutions as well as experts involved in communication and development believe that ICTs in education will be of great help to achieve the Millennium Development Goals of universal primary education through following ways:

1. **Teacher Training:** Increase the supply of trained pre-service teachers through ICT-enhanced training and by creating teacher networks. Teacher training programme through ICT will be more effective and even can be conducted in a faster pace as compared to traditional methods.
2. **Teaching and Learning in the classroom:** The capacity development of teachers to empower them to use ICT in the classroom and the development of curricula and support materials/resources through ICT. The teaching –learning through ict will not only improve the process but also raise the student attendance rate. It will enable both the teacher as well as students to use ICTs in their current as well as future teaching learning processes.
3. **Management and administration:** Improve the efficiency and effectiveness of Ministries of education and related bodies through the use of ICTs for management and educational information. The department can use ICTs in procuring the record of the educational institutions teacher and students and other lost and expenditure aspects relating to education. The on-line admission and on-line examination have fastened the educational administration and makes the administrative process cost-effective.
4. **Policy and strategy:** Establish an enabling environment and improve the overall strategic development of education by integrating ICTs policies and strategies into the education policies. The ICTs have also enabled the educational planners to make available educational policies, plans and strategies accessible to the teachers, students, administrators, and researchers. The feedback mechanisms have become easier with the advent of ICTs.

Information and communication technologies are defined as all devices, tools, content, resources, forums, and digital services and those that can be converted into or delivered through digital forums, which can be deployed for realizing the goals of teaching learning,

enhancing access to and reach of resources, building of capacities as well as management of the educational system. These will not only include hardware devices connected to computers, and software applications, but also interactive digital content internet and other satellite communication devices, radio and television services web based content repositories, interactive forums learning management system, and management information system.

Technology has closely knit the world. We cannot deny the fact that modern society centers on information network, world wide webs have shrunk the world and are bringing about uniformity in our work, thoughts and aspirations. ICT has catalysed the efforts of globalizing knowledge. The fall out is that cultural boundaries are fading away. Information technology is leading to common way of thinking & social trends. Today Yoga lessons are common in the west while western food is common in the oriental world. Our habits, values and even our aspirations have been influenced. Today we aspire for the standards of the developed countries because we see the visuals every day. Political awareness, economic dealings cultural development, entertainment etc, are today the boons of information and communication technology that connects us. While this is the positive side, there are complaints that people are getting closer to technology rather hooked to it and moving away from each other. ICT consumes a lot of time that we otherwise would have spent socializing. Another point is that those unable to access ICT are getting increasingly marginalized in the information society, although, the access to ICT is on the rise.

Technologies useful for teaching through the distance mode

Educational technology can be used to improve the quality of education, create awareness regarding teaching technologies and equipments and to train the teachers for effective teaching. The practical implementation of new scientific technology has revolutionized the whole world of education. Teachers, who are trained in proper handling and utilizing hardware educational technology in desired way, would ensure extensive use of hardware educational technologies at the individual level. When new technology emerges, teacher is charged to be able to use it without exception. It is the same condition when a higher education institution tries to implement ICTs to support learning, their assumption is all the staff willing to use it.

E-Learning tools

E-learning is a concept of learning electronically using the internet. This type of learning is particularly successful for higher studies or corporations. There are many tools used in the e-learning procedure. They are-

Web Blog

The term 'blog' is a mingling of the words web and log. Blogs provide comments or news on a particular subject, some function as more personal online diaries. The modern blog evolved from the online diary, where people would keep a running account of their personal lives.

Social Bookmarking

The Social bookmarking sites are a popular way to store, classify, share and search links through the practice of techniques on the Internet. In a social bookmarking system, users store lists of Internet resources that they find useful.

Wiki

A wiki is a website that allows visitors to add, remove, edit and change content without the need for registration. It also allows for linking among any number of pages. This ease of interaction and operation makes a wiki an effective tool for mass collaborative authoring.

Podcasting

Podcasting is a fusion of two words " iPod", Apple's popular digital music player, and broadcasting. Podcasts are basically digital audio programs that can be subscribed to and downloaded by listeners by RSS(Really Simple Syndication).It can be accessed on any of digital audio devices, like Mp3 players, desktop, computer, laptops, mobiles etc.

Instant Messaging

An instant messaging application allows one to communicate with another person over a network in relative privacy. There are many options like Gtalk, Skype, Meetro,ICQ, Yahoo! Messenger, MSN Messenger and AOL for instant messaging.

Text Chat

Internet Relay Chat (IRC) and other online chat technologies allow users to join chat rooms and communicate with many people at once,publicly.Users may join a pre-existing chat room or create a chat room about any topic.

Internet Forums

Internet forums allow users to post a "topic" for others to review. Others users can view the topic and post their own comments in a linear fashion, one after the other. Most forums are public, allowing anybody to sign up at any time.

ICT in Classroom

Over the past 20 years, ICT in education has been commonly associated with desktop computers, and fixe line internet connectivity. However, throughout that period, radio and television(and DVDs, audiotapes, CDs, and other media) have also been deployed in large scale projects and have been shown to increase student motivation, promote change in classroom practices and support other improvements in education systems. Today, reductions in the cost, size, and power requirements of microchips have lowered the cost and increased the flexibility of ICT.

These changes have been accompanied by the creation of digital versions of familiar tools, such as cameras, telephones, smart phones and by the emergence of new less familiar tools such as tablet PCs and wireless data networks. Non-digital innovations, such as flexible and portable solar cells have also been combined with digital technologies to extend the reach of ICT to infrastructure poor areas.

As the boundaries between different kinds of devices have blurred, the pathways for introducing technology into schools have multiplied. Interactive Whiteboards or "Smart boards" enable teachers and students to write, draw, and erase just as teachers do using traditional chalkboards. But smart boards also enable them to show images and videos, and record and export their writing as digital files. Mobile phones combine telephone functionality with databases of contacts, SMS, cameras and video cameras, while smart phones go several steps further, adding data communications and more powerful processors to support e-mail and web browsing, Global Positioning System(GPS) functions, and catalogs of downloadable purpose-built tools ranging from dictionaries to scanners to knowledge management systems. The emergence of new tools and the blurring of boundaries between tools combine to greatly increase the possibilities for the use of technology in schools.

Multimedia Building Blocks

Multimedia is the media that uses multiple forms of information content and information processing (e.g. text, audio, graphics, animation, video, interactivity) to inform or entertain the user. Multimedia also refers to the use of electronic media to store and experience multimedia content.

Elements of Multimedia System

Multimedia means that computer information can be represented through Audio, Graphics, Image, Video, and animation in addition to traditional media(text and graphics).

Any multimedia application consists any or all of the following components:-

Text in Multimedia

Text and symbols are very important for communication in any medium. With the recent explosion of the internet and World Wide Web, text has become more the important than ever. Web is HTML (Hypertext Markup language) originally designed to display simple text documents on computer screens, with occasional graphic images thrown in as illustrations. Words and symbols in any form, spoken, or written, are the most common system of communication. They deliver the most widely understood meaning to the greatest number of people. Most academic related text such as journals, e-magazines are available in the Web Browser readable form.

Multimedia Sound Systems

Sound is perhaps the most important element of multimedia. It is meaningful "speech" in any language, from a whisper to a scream. It can provide listening pleasure of music, the startling accent of special effects or the ambience of a mood setting background. Sound is the terminology used in the analog form, and the digitized form of sound is called as audio.

Making MIDI Audio

MIDI (Musical Instrument Digital Interface) is a communication standard developed for electronic musical instruments and computers. MIDI files allow music and sound synthesizers from different manufacturers to communicate with each other by sending messages along cables connected to the devices.

Digital Image

A digital image is represented by a matrix of numeric values each representing a quantized intensity value. Images whether represented analog or digital plays a vital role in a multimedia. It is expressed in the form of still picture, painting, or a photograph taken through a digital camera.

Animation

Animation is the rapid display of a sequence of images of 2-D artwork or model positions in order to create an illusion of movement. It is an optical illusion of motion due to the phenomenon of persistence of vision which is the tendency of the eye and brain to continue to perceive an image even after it disappears. It is a sequence of still images with slight changes displayed rapidly so that they blend together and give a feeling of continuous motion.

ICT implementation in India: Challenges and Issues

Information and Communication Technologies have enabled the convergence of a wide array of technology based and technology mediated resources for teaching learning. It has therefore become possible to employ ICT as an omnibus support system for education. The potential of ICT to respond to the various challenges the Indian education system poses are – (Acc. to Revised National Policy on ICT in School Education2012)

1. ICT can be beneficially leveraged to disseminate information about the catalyze adaptation, adoption, translation and distribution of sparse educational resources distributed across various media & forms. This will help promote its widespread availability and extensive use.
2. There is an urgent need to digitize and make available educational audio and video resources, which exist in different languages, media standards and formats.

3. Given the scarcity of print resources as well as web content in languages, ICT can be very gainfully employed for digitizing and disseminating existing print resources like books, documents, handouts, charts, and posters, which have been used extensively in the school system, in order to enhance its reach and use.
4. ICT can address teacher capacity building, ongoing teacher support and strengthen the school system's ability to manage and improve efficiencies, which have been difficult to address so far due to the size of the school system and the limited reach of conventional methods of training and support.
5. Using computers and the Internet as mere information delivery devices grossly underutilizes its power and capabilities. There is an urgent need to develop and deploy a large variety of applications, software tools, media and interactive devices in order to promote creative, aesthetic, analytical and problem solving abilities and sensivities in students and teachers.

IT scenario in India

India is the second most populated country with more than one billion population. About 26% people in India live below poverty line and have no proper electricity, no proper drinking water, and no proper sanitation facilities. Presently, IT application in India is much lower compared to China and far eastern countries. Tele-density in india is only 2.6 per hundred compared to a world average about 15 lakh of bandwidth low speed leased lines and untimely servicing are some of the impediments that revolution would not be possible to usher in our country. The main hurdle in spreading IT and to increase the computer literacy base is the huge investment required to bring about the improvement. In our country, most people can't afford to buy computers and only substantial investment can ameliorate the scenario in telephony, power and internet and provide a wider section of our society with its benefits. While countries like India have a telephone density of about 1.5 per hundred inhabitants advanced countries like US and Sweden report around 50% homes with computers, phones and internet connection.

The Highlights of the Revised Scheme on ICT

- The non-recurring expenditure for school has been revised from 6.7 lakh to 6.4 lakh where as annual recurring expenditure has been revised from 1.34 lakh to Rs.2.70 lakh. The recurring cost will be provided for a period of 5 years from the year of sanction.
- The objective of the scheme, is to cover all Government and government aided secondary and higher secondary schools by giving priority for early coverage of school in educationally backward blocks and in areas having concentration of SC/ST/ Minority/Weaker section.

- Under the revised scheme, there is a provision of a suitably qualified full time computer teacher in each secondary and higher secondary school. In case of higher secondary school having computer related subjects as elective, there would be need for a post graduate in computers teacher.
- There are provisions for in-service (induction and refresher) training for all teachers in secondary and higher secondary schools to enable them to impart ICT enabled teaching.
- 150 SMART Schools would be sent up by state government and UTs at the district level using a grant of Rs. 25 lakh for a schools and a recurring grant of Rs. 2.5 lakh per year. This would enable provision of at least 40 computers in each such school.
- There is a provision to strengthen SIETs to contribute to e-content development.
- Management, monitoring and evaluation will be strengthened.
- Convergence with the existing programme would be essential especially in teacher training and ensuring reliable power supply and internet connectivity.
- The scheme includes National Award for teachers using ICT in schools in the teaching learning process.
- The sharing pattern will be 75:25 between centre and the state except for the north eastern states including Sikkim where the ratio would be 90:10.

Role of ICTs in Knowledge Management

Knowledge management strives at giving value to people's experiences and knowledge as key assets of the global society. ICTs have the potential of assuming a strategic role in making most efficient use of these assets, in bringing information where it is needed, to be productive and in creating knowledge that guides sustainability pathways (Walter Fust,2003). Information technology may, if well resourced and implemented, provide a comprehensive knowledge base that can be instantly accessed, interactive, and of immediate value to the user. ICT plays an important part in leveraging knowledge.

The reach of know-how and experience possessed by individuals and organizations can be used for wider benefits by capturing them using ICT tools thus enabling maximum people to easily find, understand and apply it. Since ICTs are increasingly becoming part of the day to day processes, appropriate ICT tools can facilitate effective knowledge management leading to wider knowledge sharing and application. The success of managing knowledge depends heavily on applications of ICT that facilitate an effective architecture, bringing appropriate knowledge to the point of action during the moment of need. With the help of ICT the speed and volume in which information and data can be processed and exchanged can be greatly enhanced.

Role of ICTs in knowledge management as noted by Diem Ho (2007) is to-

- provide the infrastructure (computers, broadband, wireless etc.), data collection and storage, processing, computing power, visualization, simulations.
- help convert data into useful information then into business knowledge, presumably profitable knowledge.
- help reap collective wisdom through community collaborations such as open sources and community software, wikis, and blogs to enhance quantity, quality, and thoroughness. However, the collaboration needs to be structured and have well defined orientation to be effective.
- help accelerate research and innovation with open sources and open standards.

According to Oliver D Serrat (2010), the ICT in knowledge management is used to –

1. strengthen organizational identity;
2. build and sustain learning communities and relationships;
3. create unexpected, helpful connections between people and provide access to their knowledge & ideas;
4. encourage innovation and creativity;
5. share and learn from good practices and united outcomes;
6. develop and access organizational memory;
7. share tools, methods and approaches;
8. identify internal sources of expertise.

ICT provides a wide spectrum of tools and means to facilitate value creation, as we have already seen various tools that have been used for knowledge sharing and management. However, at present e-mail and mailing lists are the most commonly used tools for knowledge sharing and collaboration. They are low cost, easy to use, widely available and compatible across different platforms. Various software platforms have been used for creating discussion groups and communities of practice to share, interact and collaborate. Some knowledge sharing platforms are eventually led to providing locale specific need based information leading to economic growth and productivity. Content Management System have enabled the organization of content and flow of information. The availability of the Internet has been instrumental in catalyzing the knowledge management movement. ICT in the form of computers and e-mail is extremely efficient and useful for storing, accessing and transferring explicit knowledge. These can also be used to foster collaboration and co-operation between people and organizations. More recently, electronic databases, audio and video recordings, mobiles, telephones, interactive tools and multimedia presentations have become available to extend the techniques for capturing and disseminating content.

Summing Up

The emerging communication and information technologies are gradually covering the entire span of human activity. Technology in all forms, new and outdated or simple and complex, can be effective tools that make individuals rethink their old beliefs, knowledge, and understandings. Convergence of emerging communication and information technologies is taking place these days, thus maximizing the strengths of individual technology. Telecommunication clubbed with computer technology has revolutionized the area of human communication. The capability to exchange information on a global basis is possible through a powerful communication tool: .the satellite. Computer technology has provided tremendous capacity to store and exchange information. The human-computer interface has made communication further efficient, in terms of cost, time and reliability. This is the reason why communication technologies are becoming popular in receiving and transmitting messages, data, voice and images. The computing and telecommunication technologies are not leaving the education sector untouched. These are enabling the teachers to develop multimedia in which text, voice, pictures, simulation, etc. can be integrated and delivered through computers as an interactive learning package. The technologies will enable us to develop what are often called virtual classrooms, virtual universities, virtual conferencing, virtual laboratories, etc. Emerging technologies appear to offer the opportunity to gain access to knowledge and closer to real life. This would lead us to a learning society. This is a single new development that can revolutionize the future of education. Virtual reality and simulation will provide the ability for people to enjoy experience that we could not get otherwise. This is an experience without risk and promoted learning in a new way. So, communication technology will provide a new strategy for education, for training experience. To compete and survive in the competitive world of education it is essential to create, adopt and utilize new technologies, which will allow efficient flow of data, voice and images to all those who want to remain updated in the fast changing world. With this, education will cross the country's border and will change the world into a 'global village'. To cater to and be responsive to the education and training needs of the people in the country and also to reach out to them, we can depend on innovative communication technologies. Fortunately, these days due to rapid developments in the area of digitization, signal processing, compression, miniaturization, VSATs, etc. communication technologies are becoming available to the general public. In this way more and more people (students in this case) would he benefited by the new technologies. In our view, technology has the potential to revolutionize training and learning.

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